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Thermodynamics of the model of equal spin-spin interactions

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Abstract

We consider the thermodynamics of the model of equal spin-spin interactions. We obtain exact expressions for the correlation functions and heat capacity of finite clusters applicable in the entire range of temperature and external fields. We analyze the obtained thermodynamic characteristics depending on the interaction parameters, the external magnetic field, and the number of particles in the cluster. We find an anomalous behavior of the heat capacity and other thermodynamic quantities due to elementary spin gap excitations occurring in the spectrum. The absence of a long-range order in the system is ensured by the presence of topological excitations (solitons). We study the effect of an anisotropic interaction parameter on the soliton structure. © 2010 MAIK/Nauka.

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Keywords

correlation function, heat capacity, spin cluster, spin-spin interaction, thermodynamics